

Chronology protection and quantized fields: Complex automorphic scalar field in Misner space

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Abstract

The renormalized stress-energy tensor $\langle T_{\mu\nu} \rangle$ of the quantized complex massless scalar field which obeys the automorphic condition in Misner space is obtained. It is shown that there exists a special value of the automorphic parameter for which $\langle T_{\mu\nu} \rangle$ is regular on the chronology horizon, and so cannot act as a protector of chronology through a backreaction on a spacetime metric. However, it is shown that, at the same time, the value of the absolute square of the field $\langle \phi\bar{\phi} \rangle$, which characterizes the quantum field fluctuations, is divergent on the chronology horizon.

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